

Chemistry (theory)

Date: 13/06/2025

Period: 08:30 AM – 11:30 AM



END OF TERM III EXAMINATION, 2024-2025

QUESTION PAPER

GRADE : SENIOR TWO (S2)

LEVEL : ORDINARY

DURATION : 3 HOURS

MARKS :

/ 100

CAMIS (Theory + Practical)

/ 40

INSTRUCTIONS:

- 1) Write your identification on this answer sheet.
- 2) This paper consists of **Two** sections: **A** and **B**.
Section A: Attempt **All** questions. **(70 marks)**
Section B: Attempt any **Three** questions. **(30 marks)**
- 3) **You do not need a periodic table.**
- 4) Silent-non programmable calculators may be used.
- 5) Use only a **blue** or **black** pen for answering and a **pencil** for drawing.
- 6) For Multiple Choice Questions, **circle** a letter corresponding to the correct answer.
- 7) The marks to be recorded into CAMIS will result from the sum of theory and practical exam marks, that will be converted out of **40 marks**.

SECTION A: ATTEMPT ALL QUESTIONS**(70 marks)**

1) Circle a letter of the correct answer on each of the following questions.

i) Which of the following best defines an *ion* in Chemistry? **(1 mark)**

- A) A molecule that consists of two or more atoms bonded together.
- B) A neutral particle made up of protons and neutrons.
- C) A substance that speeds up a chemical reaction without being consumed.
- D) An atom or molecule that has gained or lost one or more electrons.

ii) Which of the following is a characteristic of an ionic bond? **(1 mark)**

- A) Transfer electrons from one atom to another
- B) Sharing of electrons between atoms
- C) Overlapping of atomic orbitals
- D) Formation between non-metal atoms only

iii) Which of the following elements is most likely to form the metallic bonds?

(1 mark)

- A) Oxygen
- B) Chlorine
- C) Sodium
- D) Nitrogen

iv) In a metallic bond, the electrons are:

(2 marks)

- A) shared between two specific atoms
- B) delocalized and free to move throughout the structure
- C) transferred from a metal to a non-metal
- D) fixed in place between specific atoms

2) Circle a letter of the correct answer on each of the following questions.

i) Which of the following combinations will produce a salt and water only?

(1 mark)

- A) $\text{HCl} + \text{NaOH}$
- B) $\text{CuCO}_3 + \text{HCl}$
- C) $\text{Mg} + \text{HCl}$
- D) $\text{Na}_2\text{CO}_3 + \text{HCl}$

ii) What gas is evolved when dilute hydrochloric acid reacts with a carbonate salt?

(1 mark)

- A) Oxygen
- B) Hydrogen
- C) Carbon dioxide
- D) Chlorine

iii) Which of the following salts is insoluble in water?

(1 mark)

- A) Sodium chloride
- B) Potassium nitrate
- C) Ammonium sulphate
- D) Barium sulphate

- iv) Which of the following methods is suitable for the preparation of an insoluble salt like lead (II) sulphate? **(2 marks)**
- A) Neutralization of an acid with a base
 - B) Precipitation reaction between two soluble salts
 - C) Direct reaction between metal and acid
 - D) Evaporation of a salt solution
- 3) Fill in the blank spaces of the following sentences with the correct provided terms: 22.4, 6.022×10^{23} , molar mass, Avogadro's number, 2.
- i) The number of particles in one mole of a substance is known as _____ **(1 mark)**
- ii) The mass of one mole of a substance in grams is called its _____ **(1 mark)**
- iii) One mole of any substance contains _____ particles. **(1 mark)**
- iv) One mole of an ideal gas at standard temperature and pressure (STP) occupies a volume of _____ liters. **(1 mark)**
- v) 44.8 L of CO_2 at STP contains _____ moles. **(1 mark)**
- 4) Answer with **true** (T) or **false** (F) each of the following statements about oxides.
- i) Carbon dioxide (CO_2) can be formed if carbon reacts with oxygen. **(1 mark)**
 - ii) Carbon monoxide (CO) does not change the color of litmus paper. **(1 mark)**
 - iii) Sulphur dioxide (SO_2) is a basic oxide. **(1 mark)**
 - iv) Aluminium oxide (Al_2O_3) reacts with both acids and bases. **(1 mark)**
 - v) Sodium oxide (Na_2O) reacts with water to form an acidic solution. **(1 mark)**
- 5) Circle a letter of the correct answer on each of the following questions.
- i) Which one of the following elements is ALWAYS found in organic compounds? **(1 mark)**
- A) Chlorine
 - B) Nitrogen
 - C) Oxygen
 - D) Carbon
- ii) Which of the following is NOT a general property of organic compounds? **(1 mark)**
- A) High solubility in water
 - B) Low melting and boiling points
 - C) Poor electrical conductivity
 - D) High combustibility
- iii) Two alkanes, methane and ethane are CH_4 and C_2H_6 , respectively. What is the general molecular formula for alkanes? **(1 mark)**
- A) $\text{C}_n\text{H}_{2n-1}$
 - B) $\text{C}_n\text{H}_{2n+1}$
 - C) $\text{C}_n\text{H}_{2n+2}$
 - D) C_nH_{2n}
- iv) What does the term LPG stand for, and what is mainly composed of? **(2 marks)**

- A) Liquid Propane Gas, mainly composed of methane and ethane
- B) Liquefied Petroleum Gas, mainly composed of propane and butane
- C) Light Petroleum Gas, mainly composed of butane and pentane
- D) Low Pressure Gas, mainly composed of propane and methane

6) Wastes must be effectively managed for environment conservation.

i) Which of the following is the most preferred option in waste hierarchy?

(1 mark)

- A) Disposal
- B) Prevention
- C) Minimization
- D) Reuse

ii) Which of the following wastes is a type of the E-waste?

(1 mark)

- A) Food scraps
- B) Clothing and textiles
- C) Electronic devices and components
- D) Construction debris

iii) In waste management, composting is mainly used for which type of waste?

(1 mark)

- A) Plastic waste
- B) Glass waste
- C) Metal waste
- D) Organic waste

iv) What does the “3Rs” in waste management stand for?

(2 marks)

- A) Reduce, Reuse, Recycle
- B) Reclaim, Reduce, Refuse
- C) Reuse, Regenerate, Recycle
- D) Remove, Recycle, Reuse

7) Chemical reactions exist under different categories.

i) What type of reaction is represented by the following equation?

(1 mark)



- A) Decomposition reaction
- B) Synthesis reaction
- C) Single replacement reaction
- D) Double displacement reaction

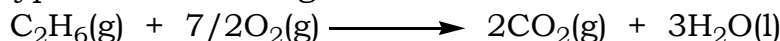
ii) Which of the following is a synthesis reaction?

(1 mark)

- A) $2\text{KClO}_3(\text{s}) \xrightarrow{\text{heat}} 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
- B) $\text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \longrightarrow \text{ZnCl}(\text{aq}) + \text{H}_2(\text{g})$
- C) $2\text{H}_2 + \text{O}_2 \longrightarrow 2\text{H}_2\text{O}(\text{l})$
- D) $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \longrightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$

iii) Identify the type of the following chemical reaction.

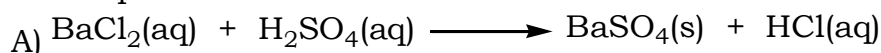
(1 mark)

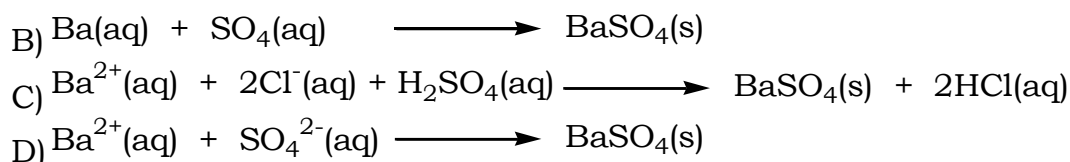


- A) Decomposition
- B) Combustion
- C) Synthesis
- D) Single replacement

iv) What is the correct ionic equation for the reaction between barium chloride and sulphuric acid?

(2 marks)





8) Fill in the blank spaces of the following sentences with the correct provided terms: sulfate, iron ions, water, carbon dioxide, salt.

- i) When dilute hydrochloric acid is added to a carbonate, _____ gas is released. **(1 mark)**
 ii) Barium chloride is used to test for _____ ions, which forms a white precipitate. **(1 mark)**
 iii) A brown precipitate is formed when sodium hydroxide is added to a solution containing _____. **(1 mark)**
 iv) In a neutralization reaction, an acid reacts with a base to form a _____ and _____. **(2 marks)**

9) Answer with **true** (T) or **false** (F) each of the following statements about organic compounds.

- i) Alkanes are also called unsaturated organic compounds. **(1 mark)**
 ii) The Compressed Natural Gas is mainly composed of methane. **(1 mark)**
 iii) The alkane with seven carbon atoms is called heptane. **(1 mark)**
 iv) The two organic compounds CH_3CH_3 and $\text{CH}_3\text{CH}_2\text{Cl}$ are isomers of each other. **(2 marks)**

10) Match each of the following element, in the column **A**, with its corresponding use in the column **B** of the table below. **(5 marks)**

SN	Column A		SN	Column B
i)	Oxygen (O_2)		A)	is used disinfection of drinking water
ii)	Phosphorus (P)		B)	is used for making ornaments
iii)	Aluminium (Al)		C)	in match industry and fertilizers
iv)	Gold (Au)		D)	is extensively used for making airplanes and spacecraft
v)	Chlorine (Cl_2)		E)	is essential for the respiration of all kinds of plants and animals

11) This question concerns the solubility of copper sulphate.

- i) Which of the following best defines the solubility? **(2 marks)**
 A) The maximum amount of solute that can dissolve in a given solvent at a given temperature.
 B) The rate at which a solute dissolves in a solvent.

C) The volume of solvent required to dissolve a solute.

D) The concentration of a solute in a saturated solution.

ii) 5 g of sugar was dissolved in 100 mL of water to make a solution. Which of the two substances is:

a) the solute? **(1 mark)**

b) the solvent? **(1 mark)**

iii) At 20°C the solubility of copper sulphate is 31. How many grams of copper sulphate will be dissolved in 65 grams of its saturated solution? **(2 marks)**

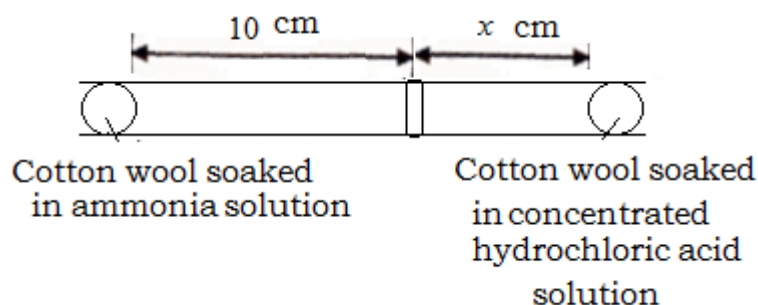
A) 30.76 grams

C) 5.24 grams

B) 15.38 grams

D) 12.15 grams

12) The set-up below was used to study the movement of gas molecules. A white disc was formed where the two gases, ammonia (NH₃) and hydrogen chloride (HCl), mixed.

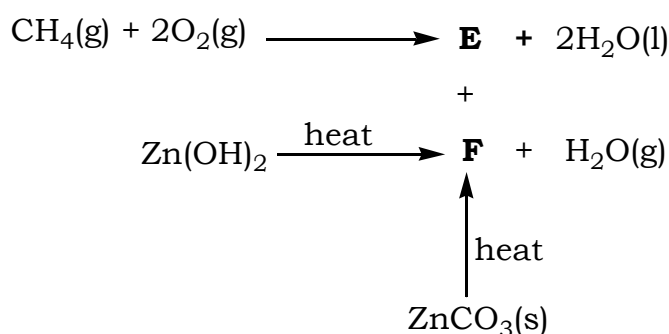


i) State the Graham's law of diffusion of gases. **(1 mark)**

ii) Given three gases: ammonia (NH₃), hydrogen chloride (HCl), and carbon dioxide (CO₂). Arrange the above gases in order of their increasing rates of diffusion. (Molecular masses: NH₃ = 17, HCl = 36.5, CO₂ = 44) **(2 marks)**

iii) Determine the distance **x** where the white disc is formed from the cotton wool soaked in concentrated hydrochloric acid. **(4 marks)**

13) Two oxides **E** and **F** are produced according to the following flowchart.



i) Identify the chemical formulae or names for the oxides **E** and **F**. **(2 marks)**

ii) What types of oxides are **E** and **F**? **(2 marks)**

iii) How many grams of water (H₂O) will be produced if 4 grams of methane (CH₄) are completely burnt in oxygen? (Atomic masses: H = 1, C = 12, O = 16). **(3 marks)**

SECTION B: ATTEMPT ANY THREE (3) QUESTIONS (30 marks)

14) Water can be threatened by different pollutants.

- i) Match each water pollutant in the column **A** with its corresponding description in the column **B**. **(4 marks)**

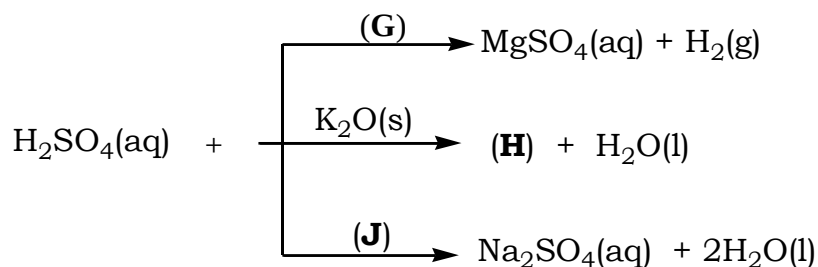
SN	Column A		SN	Column B
A)	Oil spill		(1)	Disease-causing organisms from untreated sewage
B)	Plastic waste		(2)	Often the result of leaked or dumped petroleum products
C)	Mercury		(3)	Long-lasting pollutant that harms marine animals
D)	Pathogens		(4)	Toxic heavy metal often found in industrial wastes

- ii) Fill in the blank spaces of the following sentences with the correct provided terms: sewage, power plants, eutrophication, more acidic.

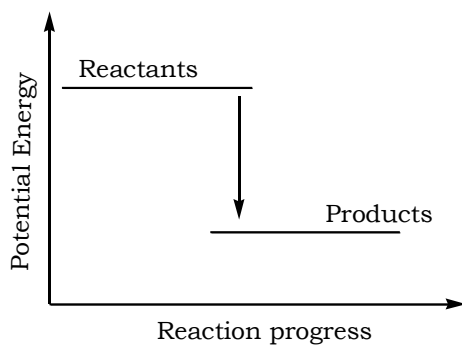
- a) The excessive use of fertilizers in agriculture can cause _____ in nearby water bodies. **(1 mark)**
- b) One of the major sources of thermal pollution is _____. **(1 mark)**
- c) The pH level of water decreases when it becomes _____. **(1 mark)**
- d) Untreated _____ from households can be a major cause of water pollution. **(1 mark)**
- iii) One of the following is an economic principle used to prevent water pollution. **(2 marks)**
- A) Polluter pays principle
B) Good pollution principle
C) Sedimentation principle
D) Capillary Action Principle

15) This question concerns some categories of chemical reactions.

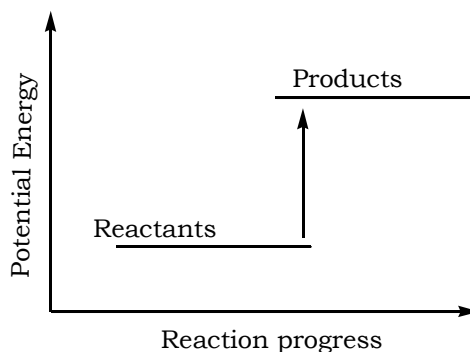
- i) Some reactions of H_2SO_4 are shown in the flowchart below. Give the chemical formulae and names for **G**, **H** and **J**. **(6 marks)**



ii) Two diagrams **P** and **Q**, show the reaction pathways as follows:

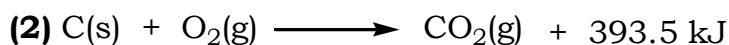
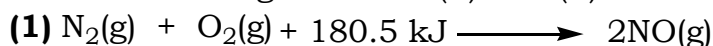


(P)



(Q)

Given the two following reactions **(1)** and **(2)**:



a) Which of the two reaction pathways represents an exothermic reaction and which one shows an endothermic? **(2 marks)**

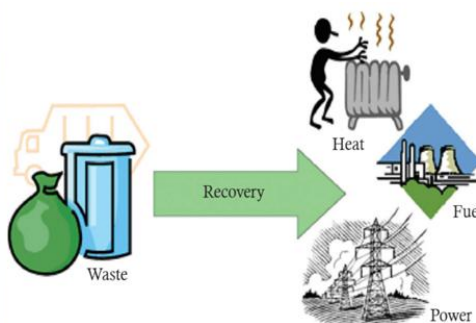
b) Match each of the reaction pathways **(P)** and **(Q)** with the corresponding reactions **(1)** and **(2)**. **(2 marks)**

(P)		(1)
(Q)		(2)

16) Although wastes pose significant challenges to the health, sanitation and to the environment in general, they can be treated for generating new solutions. The figures **M** and **N** show two of such processes.



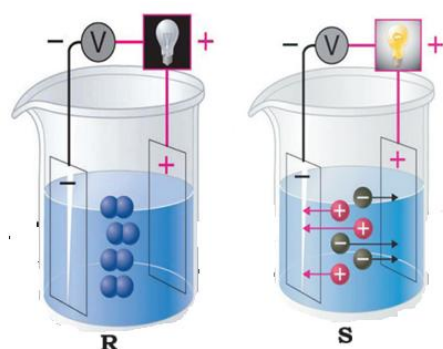
M: Preparation of compost from waste



N: Generating energy from waste

- i) Which of the following steps of effective waste management hierarchy is applied in the process **M**? **(1 mark)**
- Minimization
 - Disposal
 - Prevention
 - Recycling
- ii) Which of the following steps of effective waste management hierarchy is applied in the process **N**? **(1 mark)**
- Energy recovery
 - Disposal
 - Minimization
 - Recycling
- iii) Which of the following sectors/activities is more facilitated when the process in **M** above is applied? **(1 mark)**
- Transportation
 - Information and Technology
 - Agriculture
 - Construction
- iv) Recycling and landfilling are steps of waste management process. Given a list of some wastes found in garbage: iron metals, wood ash, peels of fruits, glass bottles.
- Which waste(s) from the above list can be recycled? **(2 marks)**
 - Which waste(s) from the above list CANNOT be recycled? **(2 marks)**
 - Recycling process helps in improving the economy of the country more than landfilling process. **True/False**. Explain your answer. **(3 marks)**

- 17) Substances can be classified as electrolytes and non-electrolytes. Two substances **R** and **S** are shown in the following figures.

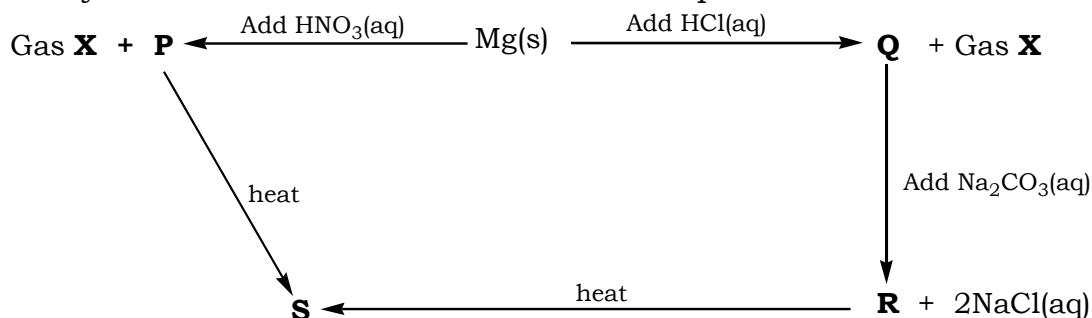


When electricity is passed through the solutions of both **R** and **S**, the bulbs glow with **S** while with **R** it does not glow.

- Explain why the bulb glows with **S** but does NOT glow with **R**. **(2 marks)**
- Which of the substances **R** or **S** is: **(1 mark)**
 - an electrolyte?

- b) a non-electrolyte? (1 mark)
- iii) Given the substances: sugar, urea, sodium chloride (NaCl) and sulphuric acid (H₂SO₄).
- a) Which of the above substance are similar to **R**? (2 marks)
- b) Which of the above substances are similar to **S**? (2 marks)
- iv) Pure water is similar to the substance **S** above. **True/False**. Justify your answer. (2 marks)

18) Study the flow chart below and answer the questions that follow.



- i) Give the chemical formulae for the main products **P**, **Q**, **R**, **S** and the gas **X**. (5 marks)
- ii) Write an equation of reaction to show how **P** is converted into **S**, on heating. (2 marks)
- iii) State the observable changes that occur when **P** is converted into **S**, on heating. (2 marks)
- iv) Name the gas which is formed when **R** is converted into **S**, on heating. (1 mark)

END

Chemistry_Alternative to Practical exam

Date: 13/06/2025

Period: 2:00 PM – 3:30 PM



END OF TERM III EXAMINATION, 2024-2025

MARKING GUIDE

GRADE	: SENIOR TWO (S2)	
LEVEL	: ORDINARY	
DURATION	: 1 HOUR 30 MINUTES	
MARKS	: <table border="1"><tr><td>/20</td></tr></table>	/20
/20		

INSTRUCTIONS:

- 1) Write your identification on this answer sheet.
- 2) Use only a **blue** or **black** pen for answering and a **pencil** for drawing.

ANSWERS

SECTION A: ATTEMPT ALL QUESTIONS

(70 marks)

Question N°	Answers	Marks allocation
1)i)	A) acidic / 1 mark -Because the gas turns into red the blue litmus paper./ 1 mark	
ii)	B) Carbon dioxide / 1 mark (CO ₂) / 1 mark	
iii)	C) Used in fire extinguishers and carbonated drinks	/ 2 marks
iv)	$\text{MCO}_3(\text{s}) \xrightarrow{\text{heat}} \text{MO}(\text{s}) + \text{CO}_2(\text{g})$	/ 2 marks
v)	$\text{CO}_2(\text{g}) + \text{Ca}(\text{OH})_2(\text{aq}) \longrightarrow \text{CaCO}_3(\text{s}) + \text{H}_2\text{O}(\text{l})$	/ 2 marks
2)i)	$\text{MO}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{MSO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$	/ 2 marks
3)i)	D) Copper (II) oxide (CuO)	/ 2 marks
ii)	$\text{CuSO}_4(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow \text{Cu}(\text{OH})_2(\text{s}) + \text{Na}_2\text{SO}_4(\text{aq})$	/ 2 marks
iii)	-Greenhouse effect / 1 mark -Global warming / 1 mark -Climate change (Accept any other correct answer)	
iv)	-Limit your use of fossil fuels / 1 mark -Use renewable and clean energy sources / 1 mark -Reducing travel by car or plane -Buying long-lasting products -Shopping seasonally and locally (Accept any other correct answer)	
	END	

Chemistry_Alternative to Practical exam

Date: 13/06/2025

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END OF TERM III EXAMINATION, 2024-2025

QUESTION PAPER

GRADE : SENIOR TWO (S2)

LEVEL : ORDINARY

DURATION : 1 HOUR 30 MINUTES

MARKS :

/20

INSTRUCTIONS:

- 1) Write your identification on this answer sheet.
- 2) This paper consists of **One** section only.
- 3) Use only a **blue** or **black** pen for answering and a **pencil** for drawing.
- 4) All answers should be written in the spaces provided in this question paper.

Student's names: _____ **Nº** _____

School: _____

Class: _____

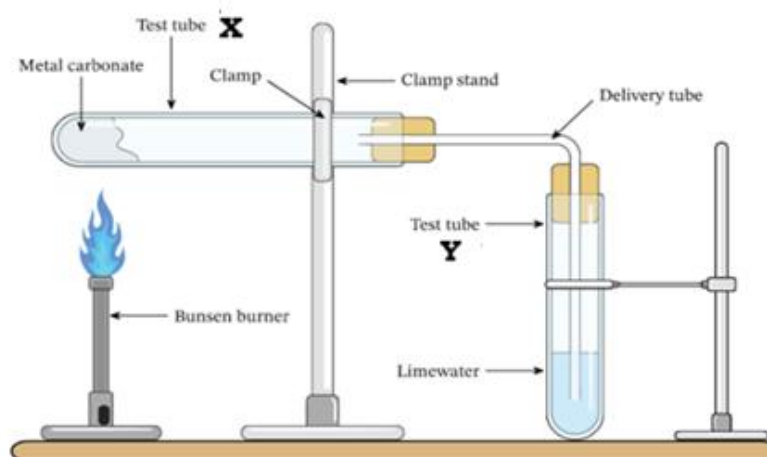
I) You are provided with the following:

SN	Apparatus	Chemicals
1	Electronic balance	Compound: MCO_3
2	Spatula	Lime water: Ca(OH)_2
3	Watch glass	Dilute sulphuric acid: NaOH
4	Test tube	Dilute sodium hydroxide: H_2SO_4
5	Delivery tube	Heating source (Bunsen burner)
6	Retort stand	Trips of Blue and Red litmus papers
7	Clamps	

II) Procedure:

- 1) About 0.5 grams of compound MCO_3 , was weighed.
- 2) MCO_3 which is a green-blue compound.
- 3) The weighed amount was introduced in the test tube.
- 4) Apparatuses were arranged according to the set up shown in the figure below.

III) Experimental set up:



1) The test tube **X** was heated with a Bunsen burner until there was no further change. Both the blue and red litmus papers and lime water were used to test the gas released.

Observations:

- Effervescence of a colourless and odourless gas from the test tube **X**.
- The gas turns into red the moist blue litmus paper.
- The gas has no effect on the red litmus paper.
- The gas turns milky the limewater in the test tube **Y**.
- A black residue remains in the test tube **X**.

Questions:

i) The released gas when heating **MCO₃** is: **(1 mark)**

- A) acidic
- B) basic
- C) neutral
- D) amphoteric

Explain your answer. **(1 mark)**

ii) What is the chemical name and formula for the gas released from the test tube **X**? **(2 marks)**

- A) Sulphur dioxide (SO₂)
- B) Carbon dioxide (CO₂)
- C) Carbon monoxide (CO)
- D) Nitrogen monoxide (NO)

iii) Which of the following are common uses of the gas in 1)(ii) above? **(2 marks)**

- A) Used as a fuel and in light bulbs
- B) Used in the production of oxygen and hydrogen
- C) Used in fire extinguishers and carbonated drinks

D) Used in the extraction of iron and gold

iv) Write the correct chemical equation which takes place in the test tube **X**, when **MCO₃** is heated? **(2 marks)**

v) Write the correct chemical equation which takes place in the test tube **Y**, when the gas in (ii) gets into contact with lime water? **(2 marks)**

2) To the residue in test tube **X**, excess dilute sulphuric acid, H₂SO₄(aq) was added and warmed gently.

Observations:

➤ The black solid residue dissolved to give a blue solution containing the metal **M**.

i) Write the complete chemical equation which takes place. Use the symbol **M** to represent the metal. **(2 marks)**

3) To the solution in (2) above, a dilute solution of sodium hydroxide, NaOH(aq) was added drop wise until in excess.

Observations:

➤ A pale blue precipitate insoluble in excess was formed.

i) Refer to the observations made in (2) and (3) and suggest the name and chemical formula of the metal oxide **MO** which is more likely to be found in the compound, **MCO₃**. **(2 marks)**

A) Zinc oxide (ZnO)

B) Calcium oxide (CaO)

C) Magnesium oxide (MgO)

D) Copper (II) oxide (CuO)

ii) Write the relevant equation which takes place when a dilute solution of sodium hydroxide, NaOH(aq) is added to the blue solution formed in (2). Use the actual symbol of the metal as deduced from your answer in 3)(i). **(2 marks)**

iii) Give any two environmental problems caused by the gas in 1)(ii). **(2 marks)**

iv) Suggest any two (2) preventive measures to minimize the problems stated in 3)(iii) above. **(2 marks)**

END

Chemistry_Alternative to Practical exam

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END OF TERM III EXAMINATION, 2024-2025

MARKING GUIDE

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(70 marks)

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	END	